3. Theory of Operation and Troubleshooting

3.1. Circuit Board Description

MAIN PWB

The MAIN PWB contains the V-30 CPU, 640K RAM, Interrupt, Serial, Parallel, LCD Controller, and the Internal 2400BPS Modem circuits. Also contained on the MAIN PWB is a "soldered-on" circuit board (Power Control PWB). The Power Control PWB controls both batteries and the sensing of low power. When replacing the MAIN PWB. it is not required to remove the Power Control PWB.

ROM PWB

The ROM PWB contains the 512K system ROM, where the BIOS information, MS-DOS 3.3, DOS Manager, and LAP-LINK are located.

Silicon Hard Disk (MMC-253)

The Silicon Hard Disk is available in 1-Megabyte (PC-17-01) or 2-Megabyte (PC-17-02) versions. The Silicon Hard Disk is accessed as the logical C: Drive and is backed up by the NiCd Battery. Data can be held on the Silicon Hard Disk for 5 to 7 days. The 1-Megabyte version is identified by p/n HMC-253C and the 2-Megabyte version is identified by p/n HMC-253B.

KEYBOARD ASSEMBLY

The KEYBOARD Assembly is a full 78-key keyboard with 12 function keys and an enbedded keypad. There is a separate pad to control the cursor (ARROW Keys). Also on the keyboard is a key labeled "Fn", which is used to activate the functions printed in red on the keys (HOME, END, PAGE UP, PAGE DOWN, etc.) All of the control logic for the keyboard is contained on the keyboard. The keyboard is equivalent to a PS/2 derivative keyboard.

RAM and ROM Cards

The 256 K RAM Card (PC-17-41) and the ROM Card can be accessed as the logical B: Drive.

Note: The system files must be on the card in order to boot from the card.

The RAM Card contains a lithium battery which backs up the data for at least six months. The voltage rating on the lithium battery is +3 V. It consumes less than 10 uA.

Data on the card can be protected by setting the WRITE-PROTECT switch. The switch is located on the end of the RAM card and the WRITE PROTECT mode is activated by moving the switch from the left to the right.

Molicel Battery Pack

The Molicel Battery Pack is also referred to as the system battery. It provides operating power to the UltraLite for approximately 2 hours, when properly charged. See the Operation section, "Recharging the Batteries" for proper recharging procedures.

Initially, recharging may take as long as 16 hours, but subsequent recharging requires only 7 to 10 hours.

NiCd Battery Pack

The NiCd Battery Pack is also refered to as the Back-up Battery. It provides power to the silicon hard disk and lasts for approximately 5 to 7 days between charges. The recharging procedure for the NiCd Battery Pack is the same as for the Molicel Battery Pack. Since the life of the battery is 5 to 7 days of power, if the UltraLite will not be used for an extended period of time, the AC Adapter should be connected.

Note: The AC Adapter cannot overcharge the batteries. Also, use of the UltraLite is permitted when the batteries are being recharged.

LCD Panel

The LCD Panel is a supertwist backlit LCD, with a 640 x 200 resolution (CGA standard). It also has a double-dot font capability which doubles the thickness of the characters. Through SETUP, the AUTO-POWER-DOWN Mode can be set. This is a power saving mode. In this mode, after 5 minutes of keyboard inactivity, the backlight will power down. Also in SETUP, the LCD Panel can be configured to be used at full brightness or half brightness.

Power Supply (DC/DC Converter)

The Power Supply converts the input voltages from the AC Adapter to +5 V, - 5 V, +10 V, -10 V, and -24 V. These voltages are used for logic (+5 V), modem circuits (+10 V, -1V), and driving the LCD panel (-24 V). Also +10 V is used to develop approximately 200 V AC required to drive the backlit EL Panel.

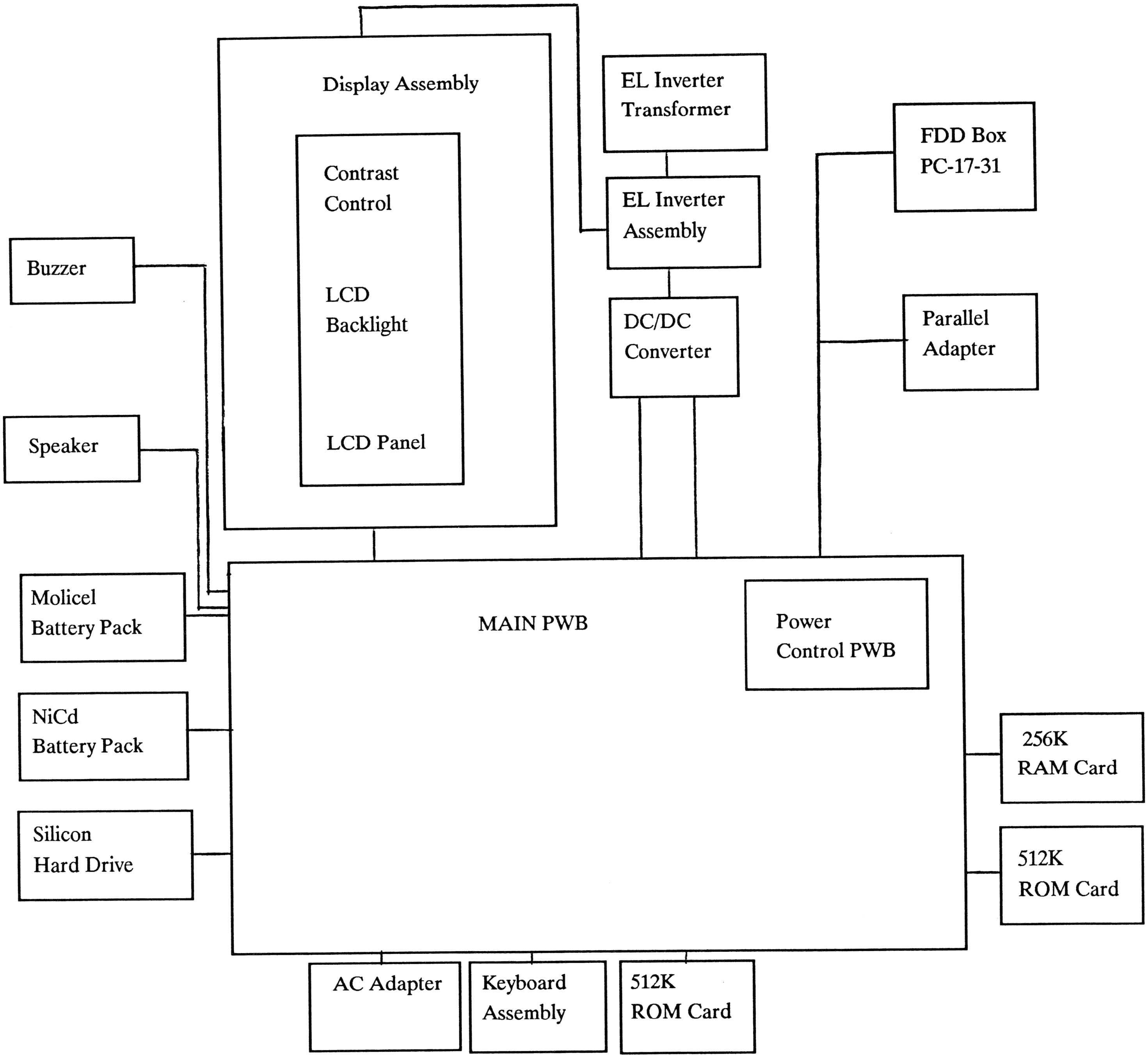
EL Inverter Assembly

The EL Inverter Assembly converts the inputted DC voltage to approximately 200 VAC. The AC voltage is then used to power the backlit EL Panel.

EL Inverter Transformer

The EL Inverter Transformer is used in conjuction with the EL Inverter Assembly to develop the 200 VAC for the backlit EL Panel.

UltraLite System



3.2. Troubleshooting Guide

The UltraLite Troubleshooting Guide is divided into three sections:

- Troubleshooting the DC/DC Converter and Power Circuits
- Troubleshooting the LCD Assembly
- Other Common Error Conditions and Solutions

This guide also contains Power-On-Self-Test (Post) errors, an explanation of battery messages, and other basic troubleshooting techniques.

3.2.1 Troubleshooting the DC/DC Converter and Power Circuits

This section explains some of the situations that may occur when a unit is defined as having "no power". The following topics are discussed:

- How to identify which PWB in the power supply circuit is defective
- How to identify which battery is defective and how to test that battery
- How to identify a defective LCD Assembly
- How to charge the batteries correctly

If the unit is running on the AC Adapter, check that the voltage outputs of the adapter are correct. The output voltages should measure 12 VDC at pin 1 and 5 VDC at pin 3. The CHG line, pin 2, should measure approximately 16 V.

Note: The CHG indicator will turn ON only when the system battery (Molicel) is depleted. However, the LOW BATTERY indicator will turn ON when either the system battery or the backup battery (NiCd) is too low.

Check to make sure the batteries are properly charged:

1. Set the BACKUP POWER switches to ON. They are located on the bottom of the unit.

2. Check to make sure the unit is turned OFF.

3. Plug in the AC Adapter.

4. While the batteries are charging, both the CHG and POWER lights should be ON.

Note: The CHG indicator will always be ON when the AC Adapter is not connected to the unit. It will only turn OFF when the AC Adapter is plugged in and the batteries are fully charged.

5. When the LOW BATTERY indicator, located on the UltraLite, and the CHG indicator, located on the AC Adapter, turn OFF, charging is completed. This may take 16 hours initially, and subsequent charges may take 7 to 10 hours. The unit may be used while the batteries are being charged.

Identifying a Defective Battery

If a battery is suspected to be defective, follow the above steps to recharge the batteries.

NiCd Battery

The NiCd battery is also referred to as the Backup Battery. It provides power to the Silicon Hard Disk. The charge in the battery will last approximately 5 to 7 days. If the NiCd battery is suspected to be defective, check the data on the Silicon Hard Disk. If the data is destroyed in any way, or if it is gone completely, replace the NiCd battery pack. When the unit is not in use, the NiCd battery should be charged after every 5 to 7 hours of use.

Molicel Battery

The function of the Molicel battery is to provide power to the system. The charge in the Molicel battery lasts approximately 2 hours. Initially, the battery may take 16 hours to charge. Check to make sure it was charged properly. The Molicel battery has an output of 12.6 V, 600 mA. A symptom of a defective Molicel battery is that the LOW BATTERY indicator never turns OFF, even after the CHG indicator has gone OFF. Another symptom is that the unit does not power up after proper charging or that the CHG indicator never turns OFF.

Note: If the unit still does not charge the batteries properly, check to make sure the insulating tape and covers have been installed on the bottom of the MAIN PWB, and the top of the EL transformer. If these protective covers are not present, the batteries may draw excessive current, and damage the batteries.

Measure the output of the internal DC/DC Converter. The output voltages should be +/- 5 V, +/- 10 V, and -24 V. Measure these voltages at pins 1 through 7 of connector PWROUT. This connector is located under the Keyboard Assembly.

3.2.2 Troubleshooting the LCD Assembly

Some of the sypmtoms of a defective LCD Assembly are:

- No backlight
- No display
- No brightness or poor brightness control

No Backlight

Before performing extensive troubleshooting, check the following items:

- Loose connections at the EL Inverter Transformer
- Loose input/output connector on the EL Inverter Assembly

The LCD Assembly requires approximately 200 VAC to operate the backlight feature. This high voltage is developed at the EL Inverter Assembly and the EL Inverter Transformer. Check the voltages into the EL Inverter Assembly (PWB). The connector that should be checked is from the DC/DC Converter to the EL Inverter Assembly. For convenience, measure the voltages from the top to the bottom. The following are acceptable voltage levels:

- +5 V
- +5 V
- +9 V
- +30 V

If any of these voltages are not present, check for broken or disconnected cables. If there are no loose connections, replace the DC\DC Converter. If replacement of the DC\DC Converter doesn't solve the problem, replace the EL Inverter.

To check the EL Inverter Transformer for 200 VAC, VERY CAREFULLY measure to see if the 200 VAC exists on the cable from the EL Inverter Assembly to the LCD Assembly. If the 200 VAC is not present, replace the EL Inverter Transformer.

3.2.3 Common Error Conditions and Solutions

The following is a list of the more common failures that are possible in the UltraLite along with solutions.

BLUE SCREEN WITH A WHITE LINE DOWN THE MIDDLE OF THE SCREEN

- Defective or disconnected ROM PWB.

ONLY BACKLIGHT FUNCTION OPERATES, BUT UNIT APPEARS TO BOOT UP

- Defective or disconnected LCD cable.
- Loose CONTRAST control.

CHG INDICATOR ALWAYS ON

- Check/replace Molicel Battery.

CHG INDICATOR TURNS OFF, BUT LOW BATTERY INDICATOR REMAINS ON

- Check/replace Molicel Battery and/or NiCd Battery.

UNIT FAILS TO POWER UP USING BATTERY POWER

- Check/replace Molicel Battery.

The following is a list of error messages (and possible solutions) that are displayed with a note "Error, press F1" whenever a hardware error is detected. To reboot the system, press the **ALT-CTRL-DEL** keys simultaneously. This resets the computer to its default parameters and may clear up any temporary problems.

NO SCANCODE FROM KEYBOARD (XXh = SCANCODE, CHECK KEYBOARD)

- Check/replace Keyboard Assembly or Keyboard cable.

BAD DMA PORT = XX

- Check/replace MAIN, ROM PWBs.

ROM BAD CHECKSUM

- Check/replace MAIN, ROM PWBs.

TIMER CHIP COUNTER 2 FAILED

- Reset the unit. This error may occur if the unit is turned ON, OFF, and then back ON again quickly.
- Check/replace MAIN PWB.

DISK BAD

- Defective diskette/disk drive.
- Check/replace cables.

DISKETTE DRIVE 0 SEEK FAILURE

- Check/replace disk drive.
- Check/replace cables.

BAD RAM AT XXXX=XXH, EXPECTED=XX

- Check/replace MAIN PWB.

TIMER OR INTERRUPT CONTROLLER BAD

- Reset the unit. This error may occur if the the unit is turned ON, OFF, and then back ON again quickly.
- Check/replace MAIN PWB.

HARD DISK INITIALIZATION FAILURE HAS BEEN NOTED ...

- Check/replace Silicon Hard Disk.

INVALID PARTITION TABLE. ERROR LOADING OPERATING SYSTEM. MISSING OPERATING SYSTEM

- Check/replace Silicon Hard Disk.

DISK BOOT FAILURE. NON-SYSTEM DISK OR DISK ERROR. REPLACE AND STRIKE ANY KEY WHEN READY

- Defective diskette/disk drive.
- Disk (RAM Card) is without boot tracks.

Low Battery Messages

The following two messages are displayed when the system battery is too depleted to continue operation. The first message appears when the computer is turned ON; the second message appears during operation. When both messages appear, simply plug in the AC Adapter.

POWER FAILURE HAS OCCURRED.

PLEASE RECHARGE THE BUILT-IN BATTERY WITH THE AC ADAPTER.

PRESS THE F1 KEY TO CONTINUE ...

POWER FAILURE HAS OCCURRED.

SAVE ALL DATA FILES IMMEDIATELY. PLEASE RECHARGE THE BUILT-IN BATTERY WITH THE AC ADAPTER.

PRESS THE F1 KEY TO CONTINUE ...

Note: **If the first message appears immediately after powering up, check that the BACKUP BATTERY switches are both in the ON position. If they are in the OFF position, the same error appears, even if the batteries are fully charged.**

Troubleshooting Hints

The following troubleshooting hints refer to the internal 2400 BPS Modem, LAP-LINK, and basic steps that should be performed.

- Disconnect all peripherals.
- When using the internal 2400 BPS modem, check to make sure the RJ11 cable is plugged into the wall jack and the LINE Port and the telephone equipment cable is plugged into the TEL Port.
- If problems occur when using LAP-LINK, check the cable hookup and the floppy disk (formatted properly and the Write-Protect switch is set to UNPROTECTED).
- Check the CONFIG switches.

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